AUGUST 2000

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

HRF Flight Rack One Integration Test Procedure II: Payload Rack Checkout Unit Mechanical Operations and Fluid Sampling

LS-71139-2B

PROJECT DOCUMENT APPROVAL SHEET		
DOCUMENT NUMBER LS-71139-2B	**DATE** 8/31/00	**NO. OF PAGES** 74

HRF Flight Rack One
Test Procedure II:
Payload Rack Checkout
Unit Mechanical Operations
and Fluid Sampling

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DATE	PREPARED BY	CHANGE APPROVALS	CHANGE NUMBER

Report Number LS-71139-2B **Date:** 8/31/00

HRF Flight Rack One
Test Procedure II:
Payload Rack Checkout
Unit Mechanical Operations
and Fluid Sampling

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REVISION/CHANGE APPROVALS

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				Unit Manager	Projects Manager

DOCUMENT NUMBER LS-71139-2B	**DOCUMENT CHANGE/ REVISION LOG**	PAGE 1 OF 1

CHANGE/ REVISION	DATE	DESCRIPTION OF CHANGE	PAGES AFFECTED
BASIC	8/99	Baseline Issue	ALL
Rev A	5/00	Due to PRCU software upgraded to Block 2.0.	Pgs. I, II, III, IV, V, Vi, 1-1 thru 1-3, 1-6, 2-1, 3-1, 6-1 thru 6-31, A-1 thru A-6
Rev B	8/00	Update document to include hardware modifications, software changes and incorporate deviation sheets.	Pgs. I, II, III, 4-1, 6-18, 6-19, 6-25, A-10, A-11

Altered pages must be typed and distributed for insertion.

JSC FORM 276 (REV APR 81)

ABSTRACT

This document provides the mechanical operations, fluid maintenance procedures and instructions for fluid sampling from the Payload Rack Checkout Unit (PRCU). The procedure facilitates the startup and shutdown activities involved in supporting payload rack testing and thermal fluid sampling.

The primary purpose of the PRCU Operations and Maintenance Procedure is to outline the steps necessary for successful activation and deactivation of the test environment and to define the nominal fluid sampling procedures. The PRCU Operations and Maintenance Procedure will be conducted in the Building 241 PRCU test environment at the Johnson Space Center, Houston, Texas. A step-by-step sequence of activities to be conducted is included in Section 6.0 of this procedure.

A Test Readiness Review (TRR) will be held prior to the start of this activity. The TRR Board, Quality Engineering (QE), and the Payload Test Conductor will agree to proceed with the individual tests listed in this document.

KEY WORDS

Human Research Facility
International Space Station Program

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LIST OF ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
APID	Application Process Identifier
Amps	Ampere
Aux	Auxiliary
C&C	Command & Control
C&DH	Command & Data Handling
CB	Circuit Breaker
CPU	Central Processing Unit
DAPC	Data Acquisition and Process Controller
DR	Discrepancy Report
EIOCU	
EXPRESS	EXpedite the PRocessing of Experiments to Space Station
FOD	Foreign Object Damage
FPR	Flight Prototype Rack
hr	Hour
HRDL	High Rate Data Link
HRF	Human Research Facility
H/W	Hardware
I/O	Input/Output
ISPR	International Standard Payload Rack
JSC	Johnson Space Center
lbs	Pounds
LED	Light Emitting Diode
LTCL	Low Temperature Control Loop
LTCS	Low Temperature Cooling System
MDM	Multiplexer/Demultiplexer Module
MIL-STD	Military Standard
Mins	Minutes
Mod	Moderate
MTCL	Moderate Temperature Control Loop
MTCS	Moderate Temperature Cooling System
MSD	

N/A	Not Applicable
NASA	National Aeronautics and Space Administration
NTSC	National Television Standards Committee
OV	Orbiter Vehicle
PASS	Primary Avionics Software System
PEPSE	Programmable Electrical Power System Emulator
P/N	Part Number
PRCU	Payload Rack Checkout Unit
PSAD	Predicted Site Acquisition Display
psig	Pounds Per Square Inch Gauge
PSIV	Payload Software Integration and Verification
pwr	Power
QE	Quality Engineering
RFC	Recirculating Flow Control
RIC	Rack Interface Controller
RT ID	Remote Terminal Identifier
SBS	Satellite Business Systems
SCXI	Signal Conditioning Extensions for Instrumentation
SIR	Standard Interface Rack
Spec	Specification
sw	Switch
TBD	To Be Determined
TCS	Thermal Control System
Temp	Temperature
TPS	Task Performance Sheet
TRR	Test Readiness Review
V	Volt
VASDEV	
Vdc/MS	Volts Direct Current/
VME	Versa Module Europa
VRDS	Verification Requirements Data Sheets
WDTMR	
wrkstn	Workstation
WR	

1.0 INTRODUCTION

1.1 PURPOSE

This document provides the procedures necessary to operate and maintain the Building 241 Payload Rack Checkout Unit (PRCU) verification test facility, and establish the baseline operating procedures which will be used during fluid sampling. The expected end product of this activity is the successful activation, fluid sampling, and deactivation of the two systems: PRCU and the payload rack. This document does not address any Human Research Facility (HRF) Flight Rack to PRCU instructions other than the initial power activation, deactivation and periodic fluid sampling.

1.2 SCOPE

This document may provide task sequencing to satisfy test requirements as detailed in the document “Rack One HRF Unique Payload Verification Plan” is SSP-574000, “Human Research Facility Unique Payload Verification Plan for Rack 1, International Space Program.” The details listed herein will describe the necessary hardware (H/W), configuration, test equipment set-ups, instrumentation requirements, data requirements, safety concerns, and all other details necessary to perform the appropriate procedure.

This procedure applies to the subsystems and components of the PRCU test environment. It encompasses the initial power, configuration and activation of an International Standard Payload Rack (ISPR). Payload Software and Integration Verification (PSIV) systems performed by Lockheed Martin HRF personnel and other agencies are described herein.

A notation of To Be Determined (TBD), has been included throughout this document to signify subsystems that are to be incorporated into the PRCU test environment, but are not completely functional at this time. Upon completion of the subsystems, the PRCU will undergo acceptance testing. Subsystem operational procedure updates will be included in subsequent document revisions.

1.3 DOCUMENT OVERVIEW

This document details the test setup, tear down, and test procedures. The procedure is divided into sections:

Section 6.1 PRCU ACTIVATION
Section 6.2 PAYLOAD RACK ACTIVATION
Section 6.3 PRCU H_2O MAINTENANCE
Section 6.4 PAYLOAD RACK DEACTIVATION
Section 6.5 PRCU DEACTIVATION

1.3.1 Document Hand-Write Change Control

This document is designed to present baseline procedures for ISPR activation, deactivation, and fluid sampling. It is therefore assumed that this document is subject to hand-write changes while in use in the test area. Hand-write entries will be controlled and documented in this procedure. All hand-writes must be approved by QE and the Test Conductor prior to implementation. Quality Assurance will validate all hand-writes. If safety is affected, then Safety must also approve changes. The personnel that have Task Performance Sheet (TPS) signature authority are authorized to make hand-write changes to this document. Hand-written changes to this document will be done using deviation sheets (See Appendix A). This document will be revised to include permanent hand-written changes.

1.3.2 Warnings And Cautions

Prior to performing any operation, test personnel must be familiar with all "General Notes, Warnings, Cautions, Special Instructions and Safety Precautions" contained in the reference documents and drawings unless otherwise specified within this procedure.

1.3.3 Task Sequencing

The procedures outlined in this document are written to ensure technical completion of a specified task and are not necessarily sequenced to provide optimum crew/tool equipment utilization or rack build-up. The work is to be accomplished sequentially, unless it is more efficient to parallel the operations. The responsible Test Conductor must first evaluate any change to assure that there is no degradation of technical requirements, system safety, personnel safety, scheduling, etc. The responsible Test Conductor may give verbal authorization to perform steps non-sequentially. Sequencing changes require concurrence from Quality Assurance.

1.3.4 Repeat Operations

Prior to proceeding, operations that must be repeated require approval of the Test Conductor, and Quality Assurance. All repetitive operations must be documented in the Repetitive Operations Log (Appendix A).

1.3.5 Discrepancies

If any discrepancy occurs in the form of an equipment failure, hazard, or emergency, the personnel concerned will take appropriate action to ensure personnel and equipment safety, and report to a Quality Assurance Specialist. The Test Conductor will notify the National Aeronautics and Space Administration (NASA) facility manager and act as focal point for any

further effort required. If required, a Discrepancy Report (DR), Johnson Space Center (JSC) form 2176 will be initiated by Quality Assurance, and will be tracked and worked as described in document NT1-ADM-013 (See Appendix A).

1.3.6 Safety Support

JSC Safety & Health Requirements established in document JPG 1700.1 Version H, will be strictly adhered to throughout all phases of test activities. All hazardous activities will be coordinated with the appropriate facility personnel.

1.3.7 Emergency/Accident Procedure

The following procedures are to be used in the event of an emergency situation, (i.e., smoke or fire) or in the case of an accident involving personal injury.

Emergency procedures provide pre-planned and approved guidelines for handling potential H/W/software malfunctions and hazardous situations. If a hazardous situation occurs, the following definitions state the actions necessary to maintain control of the situation and personnel safety. Actions required for the situations not covered by these procedures shall be provided by the Test Conductor real-time, based on his/her best judgment.

Definitions

Abort Test: Take immediate and rapid actions for restoration of safe conditions removal or rescue of test personnel, notification of the appropriate personnel about the hazardous situation, and shutdown of all systems. This action is taken in catastrophic or critical hazard conditions such as fire, smoke, or serious personnel injuries.

Terminate Test: Discontinue test per the standard shutdown procedures provided. This action is required when the situation prevents further compliance with the test objectives.

Hold and Evaluate: Maintain current test conditions or proceed to safe mode to allow time to review system status and impacts of the situation. This action is required in the event of a H/W/software malfunction.

Emergency Exits and Equipment

Figure 1-1 shows the emergency exits for personnel in the test area, and shows the location of fire pull-stations and fire extinguishers. Figure 1-2 shows the emergency meeting place outside of Building 241.

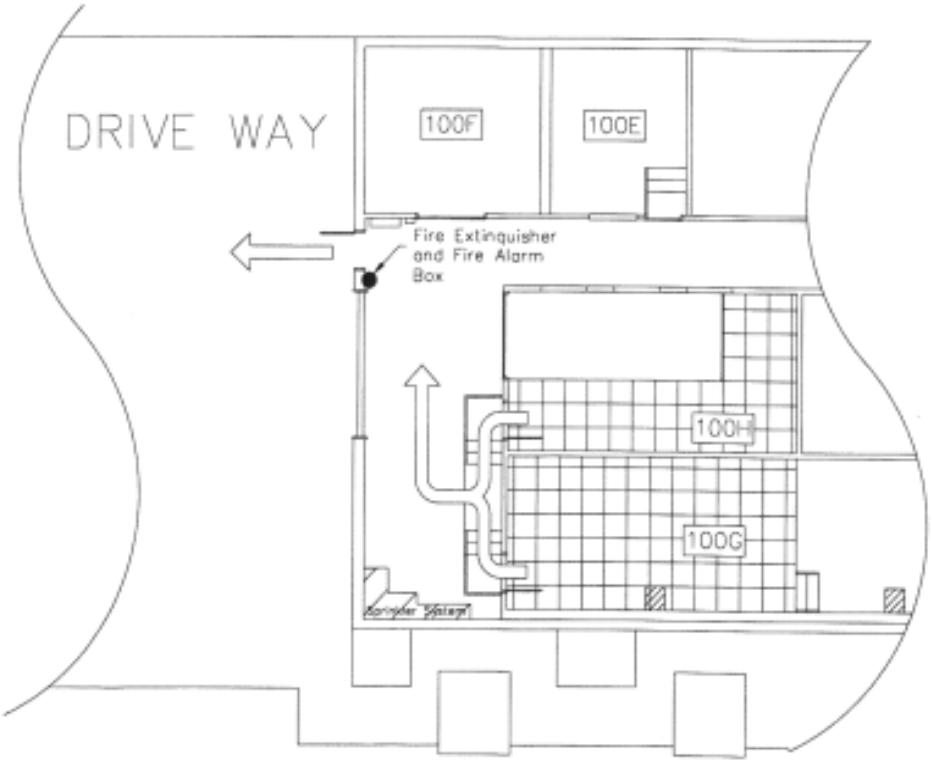

Figure 1-1 241 Facility Clean Room Emergency Exits

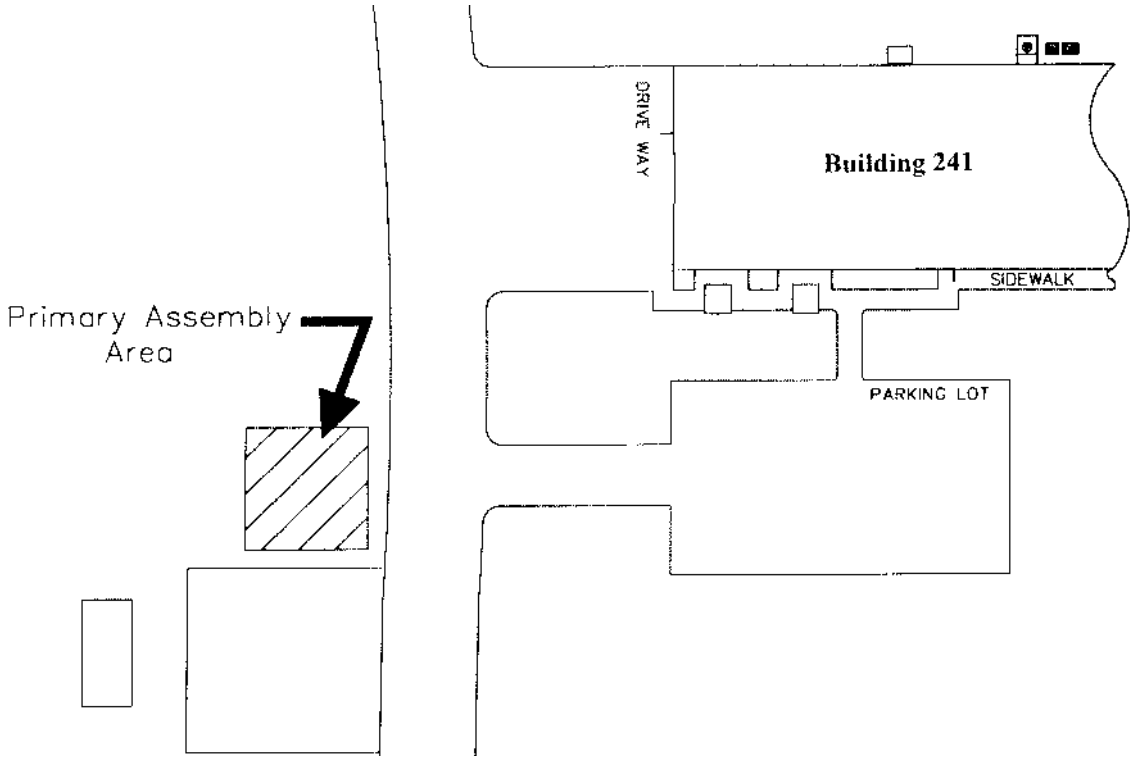

Figure 1-2 241 Facility Emergency Meeting Place

Emergency/Accident Reporting

The Facility Engineer has the primary responsibility of initiating the notification process. General Emergency Instructions:

(1) Sound the alarm and evacuate the area.
(2) If safe, render/de-energize energy systems.
(3) Initiate Flash reporting sequence (See Appendix A).
(4) Establish emergency response team to support follow on action.

Figure 1-3 shows the JSC Emergency Number and Reporting Sequence. This number is a coordinated number for the emergency related medical, fire and security groups at JSC.

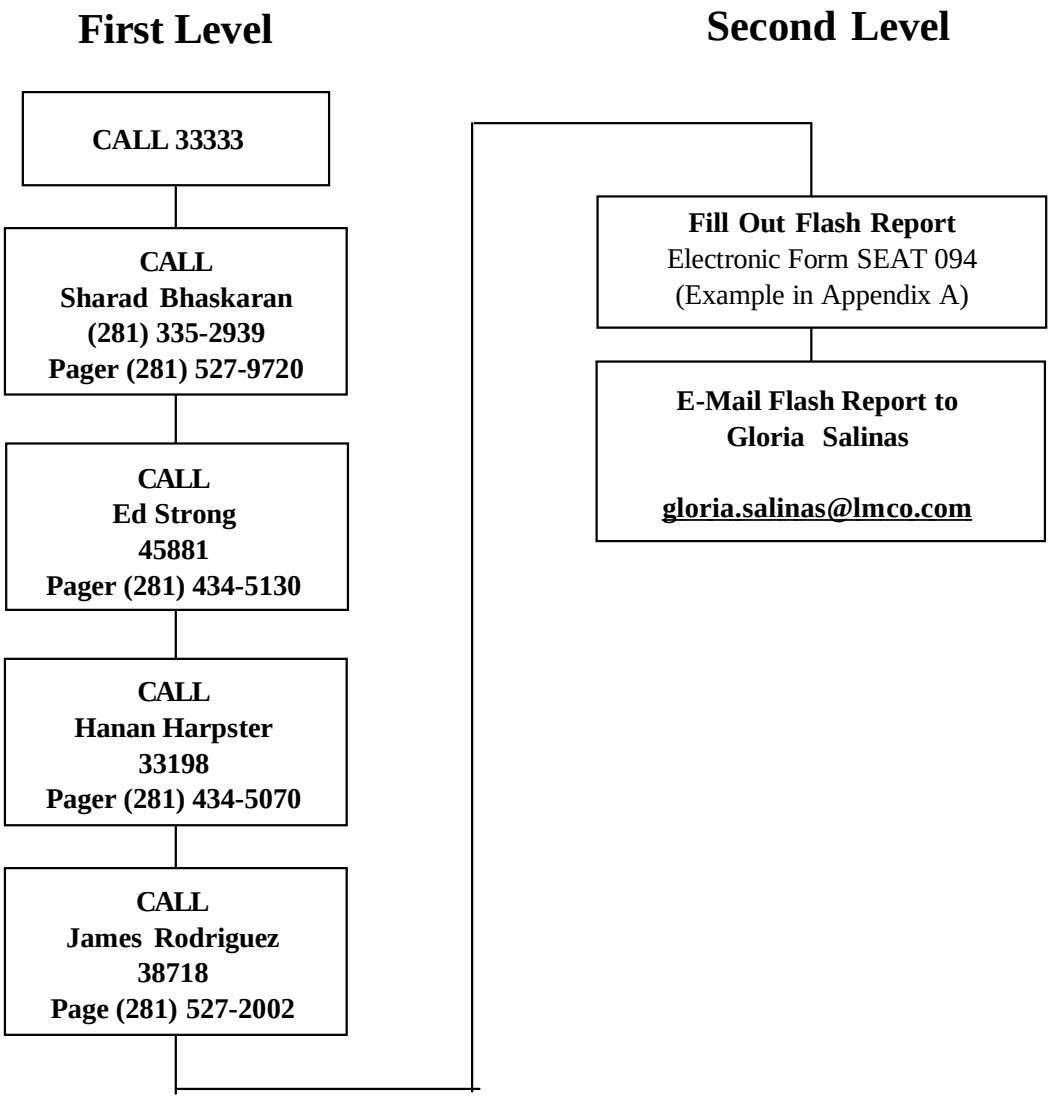

Figure 1-3 JSC Emergency Number and Reporting Sequence

Systems Emergency Procedures

The following procedures are to be carried out by the Test Conductor and Test Personnel in accordance with the condition as defined below:

CONDITION	RESPONSIBILITY	ACTION
Fire/Visible Smoke in Test Area	Test Conductor/Technician	Abort Test

(1) Sound the alarm: Activate alarm at pull box and/or phone in emergency.
(2) Do not move injured personnel unless necessary to prevent further injury.
(3) If safe, attempt to de-energize system, i.e. thermal, electric, etc.
(4) Initiate notification process. This may be conducted away from the situation from a telephone.

CONDITION	RESPONSIBILITY	ACTION
Electrical burn/smoke odor	Test Conductor/Technician	Terminate Test

(1) Shutdown all electrical test equipment systems.
(2) Locate nearest fire extinguisher.
(3) Investigate/Isolate the source of odor.
(4) If required, perform steps associated with a Fire/Smoke situation.

CONDITION	RESPONSIBILITY	ACTION
Loss of Facility Power	Test Conductor/Technician	Hold & Evaluate

(1) Evaluate the situation and impact to the test. Investigate the cause and potential frequency of occurrence. Take appropriate steps to restore the failed systems to their nominal/safe operating conditions.

Personnel Emergency/Accident Procedures

CONDITION	RESPONSIBILITY	ACTION
Serious Personal Injury	Test Conductor/Technician	Terminate Test

(1) To prevent further injury, do not move the injured personnel unless necessary.
(2) Render the area safe, then administer first aid as required.
(3) Initiate notification process.
(4) Do not leave injured personnel alone until emergency personnel arrive.

CONDITION	RESPONSIBILITY	ACTION
Minor Personal Injury	Test Conductor/Technician	Hold & Evaluate

(1) Render the area safe, then administer First Aid as required.
(2) Initiate notification process.
(3) Take injured individual to medical treatment facility.

1.3.8 Hazardous Waste Handling

Hazardous material identification, labeling and storage at Building 241 shall be done according to JSC Form 1161, “Disposal Inventory for Miscellaneous Hazardous Wastes.” Disposal containers, transportation and disposal will be provided by the designated JSC waste management service. All Thermal Control System (TCS) waste disposal in Building 241 should be coordinated through the Facility Manager.

2.0 APPLICABLE DOCUMENTATION

The following documents form a part of this Verification Plan to the extent specified. Tasks and activities referenced in pre-test, post-test, and procedural sequences may be performed using the most recent revision of the document stated.

NASA Documents:

Number	Rev.	Title
JHB 5322	C	Contamination Control Requirements Manual
KHB 1700.7	LI	Space Shuttle Payload Group Safety Handbook
LS-71135-3	A	Human Research Facility Integration Flight Prototype Rack Interface Verification Test
NT1-ADM-012	Base-line	Task Performance Sheet (TPS) NT/Occupational Safety and Institutional Assurance Division
NT1-ADM-013	Base-line	Quality Assurance Record Center Discrepancy Reporting and Tracking Systems
SSP57400		Human Research Facility Unique Payload Verification Plan for Rack 1, International Space Program

Boeing Documents:

Number	Rev.	Title
D683-44094-2	A	Human Research Facility Flight Rack Command & Data Handling (C&DH) Acceptance Test Procedure
D683-27519-1	G	User Guide for the Payload Rack Checkout Unit (PRCU)

2.1 APPLICABLE SOFTWARE

The following software provides the configuration data used in this test setup:

PRCU Software Configurations are based upon:

Software Item	Version
Payload Rack Check-out Unit (PRCU)	PRCU Block 2.0
Payload Executive Processor (PEP)	PEP Version 18

3.0 TESTING PROCESS OVERVIEW

3.1 TESTING OBJECTIVE

The test objectives are as follows:

- Activation and deactivation of the test environment.
- Definition of the nominal fluid sampling procedures.

3.2 TEST REQUIREMENTS

The following paragraphs describe the requirements of specific tests to be conducted and may include references to the specific Verification Requirements Data Sheets (VRDS) that will be completed.

3.3 TEST CONDITIONS

3.3.1 Test Conduct Ground Rules

The rules as defined in the following subparagraphs will be followed during all test activities.

3.3.2 Roles And Responsibilities

The Test Conductor is responsible for the overall management and integration of all verification testing at the systems level. The Test Conductor is responsible for the safe, successful control and conduct of all testing. The Test Conductor will assure all test team members are knowledgeable of the subsystems required for the verification test to be performed. The conductor acquires and assigns test resources and is responsible for the adequacy of test documentation. Additional responsibilities are:

- Test schedule coordination
- Test resource management
- Assurance of efficient test conduct
- Data and reports coordination

The Test Engineer is responsible for conducting the specific verification testing, including the coordination of test materials and personnel. The Test Engineer provides the test configuration, test plan and required paperwork/procedures. The Test Engineer is the principal technical focal point for a given test. The Test Engineer coordinates all test data processing and supports the Test Conductor in the preparation of the post test-report.

The Facility Engineer is responsible for ensuring that the required instrumentation is calibrated, installed and conditioned to provide the data necessary to meet the test objectives. The Facility Engineer is responsible for the coordination of certified Test Technician/Test Operator support.

The Test Technician/Test Operator is responsible for selection, setup, operation, maintenance and configuration of the test equipment in accordance with the approved test plan and procedure.

3.3.2.1 Test Area Requirements

Special emphasis is to be given to testing flight articles. The following rules will be incorporated into test documentation and compliance is the responsibility of all test team members. Repeated non-compliance may be grounds for denial of access to the test facility.

3.3.2.2 Test Area Cleanliness

Room 100H in Building 241 is certified as a level 100K clean room. Requirements for working in such an environment are detailed in Contamination Control document, JHB 5322C. All test team members with access to room 100H shall be familiar with these requirements and may undergo pre-access training or certification at the discretion of the Facility Engineer. The following rules shall be maintained at all times while in the test facility:

- Smocks, head and beard covers, shall be worn at all times.
- Test Area will be kept clean and orderly at all times.
- All debris created during test preparation, conduct, or tear down will be continuously removed to prevent Foreign Object Damage (FOD) contamination.

3.3.2.3 Test Area Access

Access to all test areas shall be limited during test operations. Only essential personnel shall be admitted. The test area, surrounding test consoles, and test instrumentation shall be controlled to restrain visitors and prevent tampering with the test article or test equipment. Determination of essential personnel will be made by the Test Conductor or Test Engineer, and policed by the Facility Engineer.

3.3.2.4 Work Area Rules

The following work rules shall be observed for the duration of testing:

- All work stands shall have toe boards sufficient to prevent any item from being accidentally dropped into a test article.
- All work stands shall have the side accessing the test article padded to prevent test article damage in the event the stand comes in contact with the test article.
- Rings and watches must be taped or removed.

3.3.2.5 Temporary Changes

Temporary changes to the Test Article configuration will be accomplished and documented as described in document NT1-ADM-012 TPS NT/Occupational Safety and Institutional Assurance Division.

4.0 TPS AUTHORIZED PERSONNEL

The TPS Authorization is comprised of two (2) types:

- Type A – A Task Performance Sheet that changes the temporary or permanent configuration of the "Flight" (Class I) or GSE test H/W. These documents must be reviewed and agreed upon by the customer before obtaining a NASA Signature. Absolutely no work is to be performed without having the proper paperwork in hand with the appropriate signatures.

- Type B – A Task Performance Sheet that does not change the configuration of the H/W which is being tested. These documents do not require a NASA Signature, and are to be coordinated with the customer and submitted for signature.

All documents must have the signature of the Lockheed Martin engineer authority in charge of verification.

If documents require H/W to be pulled out of bond, the appropriate signature authority for the bond room must be included.

LIST OF AUTHORIZED SIGNATURES

Project ID	Project Name	New Project ID	New Project Name	NASA Technical Monitor	Mission Assigned	Other Authorized Signatures
HPMHPMS1	Integration Hardware Definition & Development/Ground Rack Design and Build	HPMS	High Fidelity Mockup/Ground Development Facility/Launch Integration Facility/Payload Rack Checkout Unit	Ed Strong	HRF	Sharad Bhaskaran Robert Henneke Bob Trittipo Tom Wiggins Elton Witt
HPM1	Ground Facilities Development	Deleted – Content moved to HPMS				
HPM3	Water Cooled Rack Development	HPM3	Flight Prototype Rack (FPR) Integration /Flight Rack Integration	Ed Strong	HRF	Carlos Aquilar Sharad Bhaskaran Todd Leger Kevin Upham
HPCP	HRF Launch Package 1 Hardware Design	Deleted – Content moved to HPM3				
MEIT	Multiple Element Integration Test (MEIT)	Deleted – Content moved to HPM3				

5.0 TEST SET UP

The test setup and tear down will be governed by TPS JSC Document 1225.

5.1 PRE-TEST ACTIVITY

N/A

5.2 POST-TEST ACTIVITY

N/A

6.0 TEST PROCEDURE

The following procedure contains steps to activate the PRCU components and subsystems. The PRCU provides thermal, electrical, Payload Multiplexer/Demultiplexer Module (PL MDM) services and basic Command & Control (C&C) Simulation support operations for the payload rack under test.

Periodically, fluid sampling of both the PRCU and the payload rack under test must be conducted. This procedure instructs the user on fluid sampling from the PRCU low and moderate temperature chillers. This sampling is a maintenance process performed on the PRCU independent of payload testing. Flushing of both the PRCU and Payload Rack is not addressed in this document but can be found in the LS-71139-1 document.

The activation sequences serve to initialize the systems so that operations such as fluid sampling and payload rack testing can be completed. Deactivation procedures for both the payload rack under test and the PRCU systems can be found in Sections 6.4 and 6.5 of this document.

6.1 PRCU ACTIVATION

The activation process of the PRCU can be divided into two (2) different sections. All mechanical operations used to initially power on subsystem racks, e.g. Programmable Electrical Power Supply Emulator (PEPSE), Computational, and Data Acquisition and Process Controller (DAPC) are performed in Room 100I. These steps are performed by the operator designated as PRCU 1. All other system initialization and configuration on the PRCU Control Workstation, located in Room 100H, are performed by the operator designated as PRCU 2. All steps which pertain to the operations concerning the payload rack are performed by a payload representative or a Verification Test Team member.

6.1.1 PEPSE Activation

This section provides the information needed to initialize the PRCU electrical subsystem. Upon performance of Step 4 of this sequence, the PEPSE must be allowed to warm up for an additional thirty (30) minutes (mins). Upon warm-up completion, the electrical system will be capable of providing power to each of the ISPR panels. The settings for voltage, amperage, and slew rate may vary for different payload racks; these values must be provided by the payload developer.

TABLE 6.1 PEPSE ACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.	PEPSE, Main Facility Breaker Place main power (pwr) Circuit Breaker (CB) - on Verify the following: • Handle is in "ON" or up position		**N/A:_____ T: _____ QA:_____**
2.	PEPSE Rack, lower front panel Place main pwr CB - on Verify the following: • White status lights are on • "Full Capability" Light Emitting Diode (LED) is illuminated green		**N/A:_____ T: _____ QA:_____**
3.	PEPSE Rack, upper front panel On the "Main Menu" Display perform the following: Select: "RMT LOCK" button is illuminated yellow Select: "SET" button Select: "OV LIM" button Set Value: 140.0 V dc Select: "ACCEPT" button Select: "VOLTS" button Set Value: 120.0 V dc Select: "ACCEPT" button Select: "AMPS" button Set Value: 40.0 amps Select: "ACCEPT" button Verify the following: • "OV Lim", "Volts", and "Amps" settings agree with the values entered above		
4.	PEPSE Rack, upper front panel Depress: "START" button Verify the following: • "Output Pwr" LED is illuminated orange • Output Voltage 120 $\pm$ 1 V dc • Record time in test log **NOTE:** PEPSE must be allowed to warm-up for thirty (30) mins before pwr is applied to the rack.		**T: _____ QA:_____**
5.	PEPSE Rack, "Channel X" Main pwr **NOTE:** This step is used to program all three (3) ISPR channels (X=1, 2, or 3) Depress: "DISARM" button Verify the following: • "Channel X" display reads: (I: 1.2A @ 3ms SR: 45) Select: "PARAMETER" button Verify the following appears: • "Current Limit" Set Value: 23.5 amps Select: "PARAMETER" button Verify the following appears: • "Current Limit Delay" Set Value: Non-Current-Limiting Select: "PARAMETER" button Verify the following appears: • "Slew Rate" Set Value: 43.00 Vdc/ms Select: "PARAMETER" button Verify the following appears: • (I: 23.5A @ ncl SR: 43)		

TABLE 6.1 PEPSE ACTIVATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
6.	PEPSE Rack, "Channel X" Aux pwr Depress: "DISARM" button Verify the following appears: • (I: 1.2A @ 3ms SR: 45) Select: "PARAMETER" button Verify the following appears: • "Current Limit" Set Value: 23.5 amps Select: "PARAMETER" button Verify the following appears: • "Current Limit Delay" Set Value: Non-Current-Limiting Select: "PARAMETER" button Verify the following appears: • "Slew Rate" Set Value: 43.00 Vdc/ms Select: "PARAMETER" button Verify the following appears: • (I: 23.5A @ ncl SR: 43) **NOTE:** This step is used to program all three (3) ISPR channels (X=1, 2, or 3)		**N/A: _____ T:_____ QA: _____**

T:_____ QA: _____

6.1.2 Video Rack Activation

The PRCU video rack houses equipment used to monitor, analyze, and simulate payload video. This sequence provides the steps necessary to activate the video rack and subsystems.

TABLE 6.2 VIDEO RACK ACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.	Video Rack, front panel pwr switch - on Verify … • TBD		
2.	Video Rack, rear panel National Television Standards Committee (NTSC) television generator: "PWR" button - on Video Measurement set: "PWR" button - on		
3.	TBD		

T:_____ QA: _____

6.1.3 Computational Rack Activation

The PRCU computational rack is the main communications hub for exchanging commands between the international space station computer and the rack. The computational rack houses the PL MDM, Versa Module Europa (VME) chassis 1 and 2, along with 100 Base T

and 10 Base T Local Area Network (LAN) hubs and the MIL-STD-1553B Bus Interface. These modules complete the network which provides the emulation of Command and Data Handling (C&DH). These modules are used to process MIL-STD-1553B communications, telemetry, and audio/video signals between the ISPR and the PRCU.

TABLE 6.3 COMPUTATIONAL RACK ACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.	Computational Rack, rear panel Place Alternating Current (AC) Pwr strip - on Verify the following: • Pwr strip green LED is illuminated green		**N/A:_____ T:_____ QA:_____**
2.		PRCU workstation (wrkstn), rear panel Place Tape Drive pwr sw - on Place Central Processing Unit (CPU), Rear Panel pwr sw - on	**N/A:_____ T:_____ QA:_____**
3.		PRCU wrkstn, front panel Place Monitor pwr sw - on Verify the following: • Tape Drive LED is on • CPU LED is on • "Login Information" window appears	
4.	Computational Rack, rear panel VME Chassis #1: Place pwr sw - on Verify the following: • VME Chassis #1 switch is illuminated green VME Chassis #2: Place pwr sw - on Verify the following: • VME Chassis #2 switch is illuminated green		
5.	Computational Rack, front panel VME Chassis #1, Synergy cards: Verify the following: • "X" LED is green VME Chassis #2, Synergy cards: Verify the following: • "X" LED is green		
6.		PRCU wrkstn, "Login Information" window In the "User" field: Type: prcu <Return> In the "Password" field: Type: prcu <Return> Verify the following appears: • "PRCU" desktop	
7.		PRCU wrkstn, "PRCU" desktop Right mouse click on desktop Workspace Menu Select: "PRCU" Select: "Start PRCU" Verify the following appears: • "PRCU Main Menu" Screen	

TABLE 6.3 COMPUTATIONAL RACK ACTIVATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
8.		PRCU wrkstn, "PRCU Main Menu" Verify the following buttons are illuminated green: • "C&DH VME 1" • "VME 1 Connected" • "C&DH VME 2" • "VME 2 Connected"	

T:_____ QA: _____

6.1.4 DAPC Rack Activation

The DAPC is responsible for communication between the PRCU subsystems and the PRCU Control Workstation. The DAPC provides a central display of the H/W, software and connectivity status of the PRCU. This display allows the user to monitor sensor readings and set specific values on both the Moderate Temperature Control Loop (MTCL) and Low Temperature Control Loop (LTCL).

TABLE 6.4 DAPC RACK ACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.	DAPC Rack, front panel AC pwr strip #1: Place main pwr sw - on AC pwr strip #2: Place main pwr sw - on At Computer: Place main pwr sw - on At Monitor: Place main pwr sw - on Verify the following: • Verify pwr strip #1 LED is illuminated green • Verify pwr strip #2 LED is illuminated green • Computer LED is illuminated green • Monitor LED is illuminated green • "Begin Logon" Dialog box appears		
2.	DAPC Rack, front Panel Signal Conditioning Extension for Instrumentations (SCXI) Chassis #1: Place pwr sw -on SCXI Chassis #2: Place pwr sw -on Pwr supply #1: Place pwr sw -on Verify the following: • SCXI Chassis #1 LED is illuminated green • SCXI Chassis #2 LED is illuminated green • Pwr supply #1 LED is illuminated red		

TABLE 6.4 DAPC RACK ACTIVATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
3.	DAPC Rack, rear panel Pwr supply #2: Place pwr sw - on Verify the following: • Pwr supply #2 LED is illuminated red		
4.	DAPC Rack, front panel At Workstation: Type: <Ctrl><Alt><Delete> Verify the following appears: • "Login" information At "Password" prompt: Type: prcudapc <Enter> Verify the following appears: • "DAPC" desktop Select: "DAPC Executive" icon **NOTE:** After ninety (90) seconds, verify PSIV Agent is created.		
5.		PRCU wrkstn, "PRCU Main Menu" screen Verify the following buttons are illuminated green: • "Executive DAPC" • "Executive DAPC Connected" • "DAPC" • "DAPC Connected" • "C&DH VME 1" • "VME 1 Connected" • "C&DH VME 2" • "VME 2 Connected"	

T:_____ QA: _____

6.1.5 Vacuum System Activation

TBD (Information will be provided once system is functional.)

6.1.6 Gas System Activation

TBD (Information will be provided once system is functional.)

6.1.7 Low Temperature Chiller Activation

The Low Temperature Chiller is the first of two (2) chillers which comprise the PRCU thermal system. This subsystem is the main source of water ranging in temperature between 38 and 42°F/(3.3 to 5.6°C). The fluid system supplies the necessary coolant to cool the rack and payload drawers. Once activated, cooling for the payload rack, subrack components, and internal avionics systems can be adjusted and monitored through the PRCU Control Workstation.

TABLE 6.5 LOW TEMPERATURE CHILLER ACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.	Low Temperature (Temp) Chiller Verify the following: • Power has been off for > 5 mins • H_2O is within specification ("Spec")		
2.	Low Temp Chiller, top panel Verify the following: • Vent is not obstructed • H_2O level is above top coil		
3.	Low Temp Chiller, right side panel Verify the following: • Recirculating Flow Control (RFC) valve is closed		
4.			International Standard Payload Rack (ISPR) lower front panel Verify the following: • Low temp supply hose is connected • Low temp return hose is connected
5.	Low Temp Chiller, front panel Place main pwr sw - on Verify the following: • "Temperature Centigrade" LED is on Depress: "SETPOINT/ACTUAL TEMP" button Set Value: 4°C To set value, rotate "Adjust" dial while depressing "SETPOINT/ACTUAL TEMP" button **NOTE:** This temperature must be monitored continually for the duration of the test.		
6.		PRCU wrkstn, "PRCU Main Menu" screen Verify the following: • "Executive DAPC" • "Executive DAPC Connected" • "DAPC" • "DAPC Connected" • "C&DH VME 1" • "VME 1 Connected" • "C&DH VME 2" • "VME 2 Connected"	
7.		PRCU wrkstn, "PRCU Main Menu" screen Select: Subsystem Select: ITCS Select: Low Temp System Verify the following: • "LTCL System" window appears • "Data Stale" light is green	
8.		PRCU wrkstn, "PRCU Main Menu" screen Select: Subsystem Select: ITCS Select: ISPR X TCS ISPR X System window appears Verify the following: • "LTCL Data Stale" light is green **NOTE:** This step is used to program all three (3) ISPR Channels (X = 1, 2, or 3)	
9.	Low Temp Chiller, right side panel **NOTE:** The RFC valve must be opened gradually. Place RFC valve - open		

TABLE 6.5 LOW TEMPERATURE CHILLER ACTIVATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
10.			ISPR, lower front panel Visually inspect the following connections for leakage: • Low temp supply hose • Low temp return hose **NOTE:** If using GSE Transfer Hoses, valves must be opened manually. Open the supply valve and the return valve.
11.		PRCU wrkstn, "LTCL System" display Minimize TCS ISPR X window Verify the following: • "Delta P" is green **NOTE:** IF "DELTA P" is gray, perform the next two (2) steps.	
12.		PRCU wrkstn, "LTCL System" display Select: "DELTA P" button Verify the following: • Dialog Box appears	**N/A:_____ T:_____ QA:_____**
13		PRCU wrkstn, Dialog Box Select: "YES" Verify the following: • "DELTA P" button is green	**N/A:_____ T:_____ QA:_____**
14.		PRCU wrkstn, "LTCL System" display Minimize LTCL System window Restore TCS ISPR X window	
15.		PRCU wrkstn, "TCS ISPR X" display Select: "FLOW" button on Low Temperature Cooling System (LTCS) RFCA X Verify the following: • Dialog Box appears	
16		PRCU wrkstn, Dialog Box Select: "YES" Verify the following: • "FLOW" button is green	
17.		PRCU wrkstn, "TCS ISPR X" display Set "Flow Out" Value to: _____ pph (by depressing Up or Down arrows) Select: "Set" Verify the following: • TEMP OUT, FLOW and DELTA P are in acceptable ranges. **NOTE:** The previous two (2) steps are used to program all three (3) ISPR Channels (X = 1, 2, or 3)	
18.		PRCU wrkstn, "LTCL System" display Verify the following: • Chiller temp out and pressure are in acceptable ranges.	

T:_____ QA: _____

6.1.8 Moderate Temperature Chiller Activation

The Moderate Temperature Chiller is the second of two (2) chillers which comprise the PRCU thermal system. This subsystem is the main source of water ranging in temperature between 61 and 65°F/(16.1 to18.3°C). The fluid system supplies the necessary coolant to cool the rack and its

payload drawers. Once activated, cooling for the payload rack, subrack components and internal avionics systems can be adjusted and monitored through the PRCU Control Workstation.

TABLE 6.6 MODERATE TEMPERATURE CHILLER ACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.	Moderate (Mod) Temp Chiller Verify the following: • Power has been off for > 5 mins • H_2O is within "Spec"		
2.	Mod Temp Chiller, top panel Verify the following: • Vent is not obstructed • H_2O level is above top coil		
3.	Mod Temp Chiller, right side panel Verify the following: • RFC valve is closed		
4.			ISPR, lower front panel Verify the following: • Mod temp supply hose is connected • Mod temp return hose is connected
5.	Mod Temp Chiller, front panel Place main pwr sw - on Record Activation time in Log Book Verify the following: • "Temperature Centigrade" LED is on Depress: "SETPOINT/ACTUAL TEMP" button Set Value: 17 °C To Set Value rotate "Adjust" dial while depressing "SETPOINT/ACTUAL TEMP" button **NOTE:** This temperature must be monitored continually for the duration of the test.		
6.		PRCU wrkstn, "PRCU Main Menu" screen Verify the following: • "Executive DAPC" • "Executive DAPC Connected" • "DAPC" • "DAPC Connected" • "C&DH VME 1" • "VME 1 Connected" • "C&DH VME 2" • "VME 2 Connected"	
7.		PRCU wrkstn, "PRCU Main Menu" screen Select: Subsystem Select: ITCS Select Mod Temp System Verify the following: • "MTCL System" window appears • "Data Stale" light is green	
8.		PRCU wrkstn, "PRCU Main Menu" screen Select: Subsystem Select: ITCS Select: ISPR X TCS ISPR X System window appears Verify the following: • "MTCL Data Stale" light is green **NOTE:** This step is used to program all three (3) ISPR Channels (X = 1, 2, or 3).	

TABLE 6.6 MODERATE TEMPERATURE CHILLER ACTIVATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
9.	Mod Temp Chiller, right side panel **NOTE:** The RFC valve must be opened gradually by rotating the switch to the right. Place RFC valve - open		
10.			ISPR, lower front panel Visually inspect the following: • mod temp supply hose • mod temp return hose **NOTE:** If using GSE Transfer hoses, valves must be opened manually. Open the supply valve and the return valve.
11.		PRCU wrkstn, "MTCL System" display Minimize TCS ISPR X window Verify the following: • "Delta P" is green **NOTE:** IF "Delta P" is gray, perform the following step	
12.		PRCU wrkstn, "MTCL System" display Select: "DELTA P" button Verify the following: • Dialog Box appears	**N/A:**_____ **T:**_____ **QA:**_____
13		PRCU wrkstn, Dialog Box Select: "YES" Verify the following: • "DELTA P" button is green	**N/A:**_____ **T:**_____ **QA:**_____
14.		PRCU wrkstn, "MTCL System" display Minimize MTCL System window Restore TCS ISPR X window	
15.		PRCU wrkstn, "TCS ISPR X" display Select: "FLOW" button on Moderate Temperature Cooling System (MTCS) RFCA X Dialog Box appears Select: "YES" Verify the following: • "FLOW" button is green	
16.		PRCU wrkstn, "MTCL System" display Select: "FLOW" button Verify the following: • Dialog Box appears	**N/A:**_____ **T:**_____ **QA:**_____
17		PRCU wrkstn, Dialog Box Select: "YES" Verify the following: • "FLOW" button is green	**N/A:**_____ **T:**_____ **QA:**_____
18.		PRCU wrkstn, "TCS ISPR X" display Set "Flow Out" Value to: _____ pph (by depressing Up or Down arrows) Select: "Set" Verify the following: • TEMP OUT, FLOW and DELTA P are in acceptable ranges. **NOTE:** The previous two (2) steps are used to program all three (3) ISPR Channels (X = 1, 2, or 3)	

TABLE 6.6 MODERATE TEMPERATURE CHILLER ACTIVATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
19.		PRCU wrkstn, "MTCL System" display Verify the following: • Chiller temp out and pressure are in acceptable ranges.	

T:_____ QA: _____

6.1.9 Impedance Rack Activation

TBD (Information will be provided once procedures have been validated.)

6.1.10 Primary Avionics Software System (PASS)-1000 Activation

The PASS-1000 is a diagnostic tool used to analyze 1553 communications. For payload rack testing purposes, the PASS-1000 is set up to monitor the MIL-STD-1553B interface between the payload rack and the PRCU. The PASS-1000 can be used to perform real time snapshots of the payload rack health and status, and PL MDM to payload rack communications.

TABLE 6.7 PASS-1000 ACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.		PASS, left panel At Computer: Place main pwr sw - on • Computer LED is on • "Windows" desktop appears Select: "Cancel"	
2.		PASS, "Office 97" desktop Select: "Start" menu Select: "Programs" Select: "SBS Applications" Select: "Pass" Verify the following appears: • "PASS-1000" window	
3.		PASS, "PASS-1000" window Select: "Monitor" menu Select: "Snapshot Mode" Verify the following appears: • "Monitor Control Panel: Snapshot Mode" window	
4.		PASS, "Monitor Control Panel" window Select: "Triggers" menu Select: "PC3MON" (under Simple or MAIF2) Verify the following appears: • "Trigger Specification" window	
5.		PASS, "Trigger Specification" window Select: "EITHER" button Select: "START" button Select: "OK" button	

T:_____ QA: _____

6.1.11 Command And Data Handling Initiation

The following sequence contains steps to activate communications between the PRCU Control Workstation and the PL MDM. These communications allow for the configuration of C&DH parameters specific to the payload rack under test.

TABLE 6.8 COMMAND AND DATA HANDLING INITIATION

Step	PRCU 1	PRCU 2	Payload Rack
1.		PRCU wrkstn, "PRCU Main Menu" screen Select: "Step – C&DH" menu Verify the following appears: • "C&DH Active Session" window	
2.		PRCU wrkstn, "C&DH Active Session" screen Select: "SESSION COMMANDS" button Verify the following: • "Session Commands" window appears	
3.		PRCU wrkstn, "Session Commands" window Select: "SET SIMULATION TIME" button Verify the following appears: • "Simulation Time" window	
4.		PRCU wrkstn, "Simulation Time" window Verify the following: • Time and date displayed is current Select: "SET SIMULATION START TIME" button Verify the window closes	
5.		PRCU wrkstn, "C&DH Active Session" screen Select: "MDM DATA DEFINITION" Verify the following: • "MDM Data Definition" screen appears	
6.		PRCU wrkstn, "MDM Data Definition" Screen Select: "PAYLOAD INDEX" button Verify the "Payload Index" window appears	
7.		PRCU wrkstn, "Payload Index" screen Under "File Operations" Select: "OPEN" button Verify Dialog Box appears	
8.		PRCU wrkstn, Dialog Box Select: Appropriate Folder Select: "SELECT" button Verify Dialog Box closes	
9.		PRCU wrkstn, "Payload Index Table" screen appears Verify commands appear Select: Lowermost "CLOSE" button	
10.		PRCU wrkstn, "MDM Data Definition" screen Select: "APID" button Verify the following: • "APID Table" screen appears	

TABLE 6.8 COMMAND AND DATA HANDLING INITIATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
11.		PRCU wrkstn, "APID Table" screen Verify the desired APID file is loaded **NOTE:** If desired Application Process Identifier (APID) is not present, use the File Operations and Table Edit Operations boxes to ensure the desired APIDs are selected.	
12.		PRCU wrkstn "APID Table" screen Select: "CLOSE" button	
13		PRCU wrkstn "MDM Data Definition" screen Select: "PCDT" button Verify the "Payload Configuration Data Table" screen appears	
14.		PRCU wrkstn "Payload Configuration Data Table" screen Verify configuration information appears Select: "RIC" Index Select: "CONFIGURE" button **NOTE:** Wait ~ thirty (30) seconds before proceeding. Select: "CLOSE" button	
15.		PRCU wrkstn, "MDM Data Definition" screen Select: "PAYLOAD COMMANDS" button	
16.		PRCU wrkstn, "Payload Command Table" screen Verify the desired "PAYLOAD INDEX FILE" is selected	
17.		PRCU wrkstn, "Payload Command Table" screen Verify the desired PAYLOAD COMMANDS are present **NOTE:** If the desired payload commands are not present, use the TABLE EDIT OPERATIONS box (Add, Modify, Delete) and the FILE OPERATIONS box (Open, Commit, Save As) to achieve the desired state.	
18.		PRCU wrkstn, "Payload Command Table" screen Select: "CLOSE" button	
19.		PRCU wrkstn, "MDM Data Definition" screen Select: "PAYLOAD ANCILLARY" button	
20.		PRCU wrkstn, "Payload Specific Ancillary Data" screen Select: "PSAD" frame rate (either 0.1 Hz or 1 Hz)	
21.		PRCU wrkstn, "Payload Specific Ancillary Data" screen Enter the desired Payload Specific Ancillary Data (PSAD) frame number	
22.		PRCU wrkstn, "Payload Specific Ancillary Data" screen Enter the desired PSAD data	
23.		PRCU wrkstn, "Payload Specific Ancillary Data" screen Select: "FILE OPERATION" or "DATA OPERATION"	

TABLE 6.8 COMMAND AND DATA HANDLING INITIATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
24.		PRCU wrkstn, "Payload Specific Ancillary Data" screen Select: "SEND DATA"	
25.		PRCU wrkstn, "Payload Specific Ancillary Data" screen Select: "CLOSE"	
26.		PRCU wrkstn, "MDM Data Definition" screen Select: "BROADCAST ANCILLARY DATA" button	
27.		PRCU wrkstn, "Broadcast Ancillary Data" screen Select: Frame Rate (either 0.1 Hz or 1 Hz) Select: Frame Number	
28.		PRCU wrkstn, "Broadcast Ancillary Data" screen Select: "FILE OPERATION" or "DATA OPERATION" Select: "SEND DATA" button Select: "CLOSE" button	
29.		PRCU wrkstn, "C&DH Active Session" screen Select: "MDM DATA DEFINITION" button Verify the following appears: • "MDM Data Definition" window	
30.		PRCU wrkstn "MDM Data Definition" window Select: "INITIALIZE 1553" button Verify the following appears: • "Initialize 1553" window	
31.		PRCU wrkstn, "Initialize 1553" window At "Primary Bus": Select: "BUS A" At "RT ID": Select: "24" Select: Lowermost "CONFIGURE" button **NOTE:** Wait ~ sixty (60) seconds before proceeding. Select: "CLOSE" button Verify the window closes	
32.		PRCU wrkstn, "MDM Data Definition" window Select: "RETURN" button Verify the window closes	
33.		PRCU wrkstn, "Session Commands" window Select: "SIMULATION START" button Select: "VIEW TASK STATUS" button Verify the following appears: • 'Dialog Box'	
34.		PRCU wrkstn, 'Dialog Box' Select: "VME #1" button Verify the following appears: • "Task Status" window	

TABLE 6.8 COMMAND AND DATA HANDLING INITIATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
35.		PRCU wrkstn, "Task Status" window Verify the following tasks are running: **NOTE:** Tasks can be viewed by clicking on green boxes under "Simulation Status". Status should display under "Description": • "Simulation Start" • "1553 Input/Output (I/O) Initialization Complete" • "1553 Bus Active" Select: "CLOSE" button Verify the window closes	
36.	Computational Rack, front panel At Payload MDM: Verify the following: • EIOCU VASDEV sw - disable • EIOCU Boot WR sw - disable • EIOCU WDTMR sw - enable • High Rate Data Link (HRDL) VASDEV sw - disable • HRDL Boot WR sw - disable • HRDL WDTMR sw - enable • MSD Format sw - disable		
37.	Computational Rack, front panel At Payload MDM: main pwr sw - on Verify the following: • EIOCU Heartbeat lights are green • HRDL Heartbeat lights are green • Post/Status light are green		
38.		PRCU wrkstn, "C&DH Active Session" window Select: "MDM DATA DISPLAY" button Verify the following appears: • "MDM Data Display" window	
39.		PRCU wrkstn, "MDM Data Display" window Select: "OPERATIONAL STATUS" button Verify the following appears: • "MDM Operations Status Display" window	
40.		PRCU wrkstn, "MDM Operations Status Display" window Select: "CURRENT FRAME" button Select: "ONE SHOT" button Verify the following: • 1st word is "4XXX" • 11th word is "0100" **NOTE:** If the 1st word displays a "CXXX", Sync to BIA Initialization must be performed (Section 6.1.12). If the 1st word is "4XXX", continue to Step 38.	
41.		PRCU wrkstn, "C&DH Active Session" window Select: "MDM CONTROL" button Verify the following appears: • "MDM Control" window	

TABLE 6.8 COMMAND AND DATA HANDLING INITIATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
42.		PRCU wrkstn, "MDM Control" window Select: "MDM MODE CONTROL" button Verify the following appears: • "Payload MDM Mode" window	
43.		PRCU wrkstn, "Payload MDM Mode" window Verify the following: • "APID (hex)" field is 0046 (CORE) Payload MDM Mode: Select: "OPERATIONAL" Select: Top "CONFIGURE" button At BUS: Select: "PL LB 4" At Channel: Select: "A" Select: Bottom "CONFIGURE" button Select: "RETURN" button Verify the window closes	
44.		PRCU wrkstn, "MDM Control" window Select: "RETURN" button Verify the window closes	
45.		PRCU wrkstn, "MDM Operations Status Display" window Select: "ONE SHOT" button Verify the following: • 1st word is "4XXX" • 11th word is "0300" **NOTE:** If the 1st word displays a "CXXX", perform Section 6.1.12. Select: "CLOSE" button	
46.		PRCU wrkstn, "MDM Data Display" window Select: "RETURN" button Verify the window closes	
47.		PRCU wrkstn, "Session Commands" window Select: "RETURN" button Verify the window closes	
48.		PRCU wrkstn, "C&DH Active Session" window Select: "PEHG" button Verify "PEHG Menu" window appears	
49.		PRCU wrkstn, "PEHG Menu" window Select: "PEHG CONFIGURATION" button Verify dialog box appears	
50.		PRCU wrkstn, dialog box Select: "VME #1" button Verify "PEHG Configuration" window appears	

TABLE 6.8 COMMAND AND DATA HANDLING INITIATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
51.		PRCU wrkstn, "PEHG Configuration" window PEHG: 1 Gateway Enable: Enable Ethernet Address: 00 02 7D 01 02 01 Select: Bottom "CONFIGURE" button PEHG: 2 Gateway Enable: Enable Ethernet Address: 00 02 7D 01 02 02 Select: Lowermost "CONFIGURE" button	
52.		PRCU wrkstn, "PEHG Menu" window Select: "RETURN" button	

T: _____ QA: _____

6.1.12 Sync To BIA Initialization

Once the Payload MDM is activated, the PRCU Control Workstation is used to configure and command the MDM into an operational state. In order for the two (2) systems to successfully interact with one another, the MDM must be "synchronized" with the PRCU.

If after powering the H/W, these systems are found to be out of synchronization, the following sequence must be performed. It may be necessary to execute this sequence several times to achieve synchronization. If, after performing SYNC to BIA three (3) times, the PRCU is still displaying data which is "Out of Synchronization" the PASS-1000 can be used to verify the timing between the MDM and the PRCU.

TABLE 6.9 BIA INITIALIZATION

Step	PRCU 1	PRCU 2	Payload Rack
1.		PRCU wrkstn, "C&DH Active Session" window Select: "MDM CONTROL" button Verify the following appears • MDM Control Window Select: MDM Mode Control	
2.		PRCU wrkstn, "Payload MDM" Mode window Verify the following: • "APID (hex)" field is 0046 (CORE) Select: "SYNC TO BIA" button	

TABLE 6.9 BIA INITIALIZATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
3.		PRCU wrkstn, "MDM Operations Status Display" window Select: "ONE SHOT" button Verify the following: • 1st word is "4XXX" • 11th word is "0100" **NOTE:** The "ONE SHOT" button can be selected up to five (5) times to synchronize the PRCU. If the 11th word still reads "CXXX", repeat Section 6.1.12 in its entirety. If after the second attempt the PRCU is still not in sync, perform the following step.	
4.		PASS, "Monitor Control Panel" window Verify the following: • "31-R-29-X" header appears **NOTE:** X represents a changing variable.	N/A: ____ T: ____ QA: ____
5.		**NOTE:** Return to the appropriate step in Section 6.1.11.	

N/A: _____T:_____ QA: _____

6.2 PAYLOAD RACK ACTIVATION

When all necessary subsystems of the PRCU are activated, the Payload Rack is activated by performing the following sequence.

CAUTION: This sequence applies power to the individual ISPR locations. The Payload Rack is powered at the same time the PEPSE applies power to the panel. If the rack is receiving power, the internal mixing fan is audible.

TABLE 6.10 PAYLOAD RACK ACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.			ISPR, Upper Front Panel Place Rack power sw - on
2.			ISPR, Upper Front Panel Verify/Place the following: • Laptop pwr sw - Off • Subrack B1 pwr sw - Off • Subrack C1 pwr sw - Off • Subrack D1 pwr sw - Off • Subrack E1 pwr sw - Off • Subrack F1 pwr sw - Off • Subrack G1 pwr sw - Off • Subrack H1 pwr sw - Off • Subrack J1 pwr sw - Off • Payload pwr sw - Off • Subrack C2 pwr sw - Off

TABLE 6.10 PAYLOAD RACK ACTIVATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
2a.			• Subrack D2 pwr sw - Off • Subrack E2 pwr sw - Off • Subrack F2 pwr sw - Off • Subrack G2 pwr sw - Off • Subrack H2 pwr sw - Off • Subrack J2 pwr sw - Off
3.	PEPSE Rack "Channel X" Main display Verify the following appears: • (I: 23.5A @ ncl SR: 43) Depress: "ARM" button is illuminated green Place "Channel X" pwr sw - on		
4.		PRCU, ISPR X Main Panel Verify the following: • Main pwr indicator is orange	
5.			ISPR Verify the following: • Fan audibly engages
6.	PEPSE Rack "Channel X" Aux display Verify the following appears: • (I: 23.5A @ ncl SR: 43) Depress: "ARM" button is illuminated green Place "Channel X" pwr sw - on		
7.		PRCU, ISPR X Aux Panel Verify the following: • Main pwr indicator is orange	
8.			ISPR Verify the following: • Fan audibly engages
9.	PEPSE Rack, "Main Menu" Display Verify the following appears: • Current draw		

T:_____ QA: _____

6.3 PRCU H_2O MAINTENANCE

6.3.1 Thermal Control System (TCS) H_2O Sampling

In an effort to maintain proper water quality for the thermal cooling system, water samples must be taken once per week. The TCS uses two (2) separate chiller systems. The first is a LTCS, and the second is the MTCS. The H_2O sampling is accomplished by removing a small amount of water from the chiller via its water reservoir. The water sample is then sent to the Water Food Analysis Section, Building 37 lab for testing. The results are compared to the Purity Level as per the agreement with Human Research Facilities, NASA and Water and the Food Analysis Section (based on SSP 30573, REV A, Table 4.1-2.8) and Particulate Count per Military Standard (MIL-STD)-1246B.

6.3.2 LTCS H_2O Sampling

The LTCS H_2O Sampling section provides the necessary instructions needed to perform water samples on the LTCS. In order to obtain an accurate sample analysis, the chiller must be activated and allowed to circulate for a minimum of one (1) hour before taking the sample. If the water is found to be outside of specification, this system should be sectioned off until the water can be returned to specification by performing H_2O Change-Out or Spiking.

WARNING: Do not set the temperature setting below 32° F (0° C). If the temperature settings drop below 32° F (0° C), the internal chiller water system lines and the external cooling system will freeze.

TABLE 6.11 LTCS H_2O SAMPLING

Step	PRCU 1	PRCU 2	H_2O Lab Tech
1.	Low Temp Chiller • Activate per Section 6.1.7 **NOTE:** Operate chiller for a minimum of one (1) hour before collecting samples.		
2.	Low Temp Chiller, top panel • clean area around reservoir cover • place reservoir door - open • remove reservoir door • place reservoir cover - open • remove reservoir cover		
3.			Low Temp Reservoir • Collect H_2O Samples
4.	Low Temp Chiller, top panel • place reservoir cover - closed • install reservoir cover • place reservoir door - closed • install reservoir door		
5.			Transfer H_2O Samples to Lab for analysis
6.	Low Temp Chiller • Deactivate per Section 6.6.4		

T:_____ QA: _____

6.3.3 MTCS H_2O Sampling

The MTCS H_2O Sampling section allows samples to be taken from the MTCS. The chiller must circulate for a minimum of one (1) hour before a sample can be taken. If the water is outside specification, seal off the system until water can be replaced or returned to specification.

TABLE 6.12 MTCL H_2O SAMPLING

Step	PRCU 1	PRCU 2	H_2O Lab Tech
1.	Mod Temp Chiller • Activate per Section 6.1.8 **NOTE:** Operate chiller for a minimum of one (1) hour before collecting samples.		
2.	Mod Temp Chiller, top panel • clean area around reservoir cover • place reservoir door - open • remove reservoir door • place reservoir cover - open • remove reservoir cover		
3.			Mod Temp Reservoir • Collect H_2O Samples
4.	Mod Temp Chiller, top panel • place reservoir cover - closed • install reservoir cover • place reservoir door - closed • install reservoir door		
5.			Transfer H_2O Samples to Lab for analysis
6.	Mod Temp Chiller • Deactivate per Section 6.6.5		

T:_____ QA: _____

6.3.4 LTCL Closed Loop H_2O Sampling

The LTCL samples water flowing through the Low Temperature Cooling System. A water line hose (Loop Back Hose) is attached at the ISPR panel LTCL supply and return, allowing water to circulate throughout most of the PRCU low temperature thermal system without the connection of ISPR 1.

WARNING: Do not set the temperature setting below 32° F (0° C). If the temperature settings drop below 32° F (0° C), the internal chiller water system lines and the external cooling system will freeze.

TABLE 6.13 LTCL CLOSED LOOP H_2O SAMPLING

Step	PRCU 1	PRCU 2	H_2O Lab Tech
1.		Connect the following: • Loop-back hose P/N SED38116526-301 to LTCL Supply • Loop-back hose P/N SED38116526-301 to LTCL Return	
2.	Low Temp Chiller • Activate per Section 6.1.7 **NOTE:** Operate chiller for a minimum of one (1) hour before collecting samples.		

TABLE 6.13 LTCL CLOSED LOOP H_2O SAMPLING (CONT'D)

Step	PRCU 1	PRCU 2	H_2O Lab Tech
3.	Low Temp Chiller, top panel • clean area around reservoir cover • place reservoir door - open • remove reservoir door • place reservoir cover - open • remove reservoir cover		
4.			Low Temp Reservoir • Collect H_2O samples
5.	Low Temp Chiller, top panel • place reservoir cover - closed • install reservoir cover • place reservoir door - closed • install reservoir door		
6.			Transfer H_2O Samples to Lab for analysis
7.	Low Temp Chiller • Deactivate per Section 6.6.4		

T:_____ QA: _____

6.3.5 MTCL Closed Loop H_2O Sampling

The MTCL samples water flowing through the Moderate Temperature Cooling System only. A water line hose (Loop Back Hose) is attached at the ISPR panel MTCL supply and return, allowing water to circulate throughout most of the PRCU moderate temperature thermal system without the connection of an ISPR.

TABLE 6.14 MTCL CLOSED LOOP H_2O SAMPLING

Step	PRCU 1	PRCU 2	H_2O Lab Tech
1.		Connect the following: • Loop-back hose P/N SED38116526-301 to MTCL Supply • Loop-back hose P/N SED38116526-301 to MTCL Return	
2.	Mod Temp Chiller • Activate per Section 6.1.8 **NOTE:** Operate chiller for a minimum of one (1) hour before collecting samples.		
3.	Mod Temp Chiller, top panel • clean area around reservoir cover • place reservoir door - open • remove reservoir door • place reservoir cover - open • remove reservoir cover		
4.			Mod Temp Reservoir • Collect H_2O Samples
5.	Mod Temp Chiller, top panel • place reservoir cover - closed • install reservoir cover • place reservoir door - closed • install reservoir door		

TABLE 6.14 MTCL CLOSED LOOP H_2O SAMPLING (CONT'D)

Step	PRCU 1	PRCU 2	H_2O Lab Tech
6.			Transfer H_2O Samples to Lab for analysis
7.	Mod Temp Chiller • Deactivate per Section 6.6.5		

T:_____ QA: _____

6.3.6 H_2O Maintenance

As the ITCS cooling system is being used, elements that compose the station water will begin to change. If the water is not maintained, these elements will deteriorate beyond the specified levels of water. To prevent this, the water in the PRCU is changed out or 'Spiked' regularly, to bring these elements back within acceptable limits.

6.3.6.1 H_2O Change-Out

The H_2O Change Out procedure removes and discards old space station water from the thermal system and replenishes fresh space station water to the thermal system.

TABLE 6.15 H_2O CHANGE OUT

Step	PRCU 1	PRCU 2	H_2O Lab Tech
1.	Verify water chiller is off		
2.	On top of the water chiller, clean around the chiller reservoir cover door area with a moist towel to remove any dust or debris		
3.	Open and remove the water reservoir cover door		
4.	Open and remove the water reservoir cover panel		
5.	Attach the water chiller drain hose to the water chiller drain connector		
6.	Drain approximately five (5) gallons of the station water from the chiller reservoir into a five (5) gallon waste container		
7.	Remove the water chiller drain hose from the water chiller connector		
8.	Drain the water from the five (5) gallon waste container into a waste water container		
9.	Return the emptied five (5) gallon waste container to the water drain container. Repeat the process of attaching the water drain hose to the water chiller drain connector. Drain approximately five (5) gallons of the station water into a five (5) gallon waste container until all the water has been drained from the water chiller reservoir		

TABLE 6.15 H_2O CHANGE OUT (CONT'D)

Step	PRCU 1	PRCU 2	H_2O Lab Tech
10.	Remove the water chiller drain hose from the water chiller drain connector		
11.	Pour the fresh station water into the chiller water reservoir until the fluid level is approximately ¼" inch above the top upper most coil. Ensure that the water covers all of the cooling coils. An excess of water will result in reservoir overflow when the unit is running water through the rack		
12.	Close the water reservoir cover panel		
13.	Attach and close the water reservoir cover door		

T:_____ QA: _____

6.3.6.2 H_2O Spiking

H_2O "spiking" is an alternative method for completing water change out of the PRCU. When one (1) or more of the elements that comprise space station water does not meet the station requirements, it is necessary to add a concentrated balancing solution to return the chemical composition to the proper levels. Once the solution is added, the system must be allowed to circulate for a minimum of one (1) hour in order to assure the solution has been distributed evenly.

TABLE 6.16 H_2O SPIKING

Step	PRCU 1	PRCU 2	H_2O Lab Tech
1.	Activate the appropriate chiller		
2.	On top of the water chiller, clean around the chiller reservoir cover door area with a moist towel to remove any dust or debris		
3.	Open and remove the water reservoir cover door		
4.	Open and remove water reservoir cover panel		
5.	Attach the water chiller drain hose to the water chiller drain connector		
6.	Drain 1,000 ml of station water from the chiller reservoir into the flush container		
7.	Remove water chiller drain hose from the water chiller drain connector		
8.	Add 1,000 ml of spiking solution to the station water until the spiking solution container has been emptied. Spiking solution is supplied by the Water and Food Analytical Laboratory, Building 37, JSC **NOTE:** Chiller must circulate for one (1) hour before powering off.		
9.	Close the water reservoir cover panel		
10.	Attach and close the water reservoir cover door		
11.	Deactivate appropriate chiller		

T:_____ QA: _____

6.4 PAYLOAD RACK DEACTIVATION

Upon completion of integrated testing, all payloads and peripheral H/W should be powered down and verified off. This sequence removes electrical power from the PRCU/ISPR Panel location powering down the payload rack. In order to power down the entire integrated system, all applicable subsystems in Section 6.6 must be deactivated.

CAUTION: The Payload Rack and the PRCU must both be deactivated before attempting to disconnect the Payload Rack from the PRCU/ISPR Panel.

TABLE 6.17 PAYLOAD RACK DEACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.			ISPR Verify the following: • All payloads powered down • EXpedite the PRocessing of Experiments to Space Station (EXPRESS) Laptop powered down
2.			ISPR Upper Front Panel Verify/Place the following: • Laptop pwr sw - off • Subrack B1 pwr sw - off • Subrack C1 pwr sw - off • Subrack D1 pwr sw - off • Subrack E1 pwr sw - off • Subrack F1 pwr sw - off • Subrack G1 pwr sw - off • Subrack H1 pwr sw - off • Subrack J1 pwr sw - off • Payload pwr sw - off • Subrack C2 pwr sw - off • Subrack D2 pwr sw - off • Subrack E2 pwr sw - off • Subrack F2 pwr sw - off • Subrack G2 pwr sw - off • Subrack H2 pwr sw - off • Subrack J2 pwr sw - off
3.	PEPSE Rack “Channel X” display Place “Channel X” pwr sw - off Depress: “DISARM” button Verify the following: • “Disarm” LED is orange		
4.		PRCU, ISPR X Panel Verify the following: • Main pwr indicator is off	
5.			ISPR Verify the following: • Fan audibly disengaged

T:_____ QA: _____

6.5 PRCU DEACTIVATION

PRCU Deactivation must be performed to power off the subsystems activated during the course of water maintenance or Payload Rack Testing. It is only necessary to power off the subsystems used during the current day activities.

6.5.1 PASS-1000 Deactivation

Once the Payload Rack has been powered off and is no longer sending data across the Bus, close the PASS-1000 application, shutdown the computer, and verify the power is off.

TABLE 6.18 PASS-1000 DEACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.		PASS, "Monitor Control Panel:…" window Select: "File" drop down menu Select: "Exit" Simulation System Verify PASS-1000 Window appears Select: "File" Select: "Exit" Verify the following appears: • Dialog Box	
2.		PASS, Dialog Box Select: "YES" button	
3.		PASS, "Office 97" desktop Select: "Start" menu Select: "Shutdown" Verify the following appears: • "Shutdown" window	
4.		PASS, "Shutdown" window Select: "YES" button System will automatically shut down	

T:_____ QA: _____

6.5.2 PRCU Control Workstation Deactivation

The PRCU Control Workstation Deactivation varies depending upon the systems used and the configuration needed to perform the current day tasks. Windows from the C&DH session must be closed before proceeding with this sequence. Once the PRCU Control Workstation is deactivated, the DAPC Rack, Computational Rack and any chillers may be powered off and shutdown.

TABLE 6.19 PRCU CONTROL WORKSTATION DEACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.		PRCU wrkstn "C&DH Active Session" Select: "Exit" Verify the following appears: • Dialog Box Select: "OK"	
2.		PRCU Wrkstn, "EPS ISPR X" Screen Select: "Quit" button	
3.		PRCU Wrkstn, "EPS" Screen Select: "Quit" button	
4.		PRCU wrkstn, TCS ISPR X Window Select: "QUIT" button Restore MTCL System Window Select: "QUIT" button On PRCU Main Menu Select: "QUIT" button On PRCU Desktop Select: "EXIT" button Logout Confirmation Box appears Select: "OK" button	
5.		PRCU wrkstn, "Payload Rack Checkout Unit" Main Menu Select: "Quit" On PRCU desktop Select: "Exit"	
6.		PRCU wrkstn, "Logout Confirmation" Box appears Select: "OK"	
7.		PRCU wrkstn, front panel Monitor by switching main pwr -off	
8.		PRCU wrkstn, rear panel At Tape Drive: main pwr sw -off At CPU: main pwr sw -off	N/A:_____ T:_____ QA:_____

T:_____ QA: _____

6.5.3 Video Rack Deactivation

This section must be performed after the computational rack is powered off. TBD (Information will be provided once system if functional)

6.5.4 Low Temperature Chiller Deactivation

The Low Temperature Chiller can be powered off during normal PRCU deactivation if water maintenance has been performed. However, the chiller must remain powered to circulate the water for a minimum of one (1) hour after performing the H_2O Change Out or "spiking" procedure.

TABLE 6.20 LOW TEMPERATURE CHILLER DEACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
			NOTE: If using GSE Transfer Hoses valves must be closed manually. Close the return valve followed by the supply valve.
1.	Low Temp Chiller, right side panel **NOTE:** The RFC valve must be closed gradually. Place RFC valve - closed		
2.	Low Temp Chiller, front panel Place main pwr sw - off Verify the following: • "Temperature Centigrade" LED is off **NOTE:** Enter Deactivation time in Log Book.		

T:_____ QA: _____

6.5.5 Moderate Temperature Chiller Deactivation

The moderate chiller can be powered off after testing. However, if water maintenance has been performed, the chiller needs to circulate for a minimum of one (1) hour before deactivation.

TABLE 6.21 MODERATE TEMPERATURE CHILLER DEACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
			NOTE: If using GSE Transfer Hoses, all valves must be closed manually. Close the return valve followed by the supply valve.
1.	Mod Temp Chiller, right side panel **NOTE:** The RFC valve must be closed gradually. Place RFC valve - closed		
2.	Mod Temp Chiller, front panel Place main pwr sw - off Verify the following: • "Temperature Centigrade" LED is off **NOTE:** Enter Deactivation time in Log Book.		

T:_____ QA: _____

6.5.6 Impedance Rack Deactivation

TBD (Information will be provided once procedures have been validated).

6.5.7 Vacuum System Deactivation

TBD (Information will be provided once system is functional)

6.5.8 Gas System Deactivation

TBD (Information will be provided once system is functional)

6.5.9 DAPC Rack Deactivation

Deactivate the DAPC Rack once the Thermal and/or the PRCU Control Workstation flow is removed from the Payload Rack.

NOTE: After the rack is powered off, the PRCU Control Workstation is no longer capable of monitoring the Thermal, Gas, Vacuum, and Power Systems.

TABLE 6.22 DAPC RACK DEACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.	DAPC Rack, front panel At Computer: "Runs With Suns" window Select: "CLOSE" button		
2.	DAPC Rack, front panel At Computer: "DAPC" Desktop Select: "Start" menu Select: "Shutdown" Verify the following appears: • "Shutdown" window		
3.	DAPC Rack, front panel At Computer: "Shut down windows" Select: "YES" button Verify the following appears: • "OK to turn off computer" message • Computer main pwr sw - off Verify the following: • Computer LED is off At Monitor: Place main pwr sw - off Verify the following: • Monitor LED is off		
4.	DAPC Rack, front panel SCXI Chassis #1: Place pwr sw - off SCXI Chassis #2: Place pwr sw - off Verify the following: • SCXI Chassis #1 LED is off • SCXI Chassis #2 LED is off		
5.	DAPC Rack, rear panel Power Supply #2: Place pwr sw - off Verify the following: • Power Supply #2 LED is off		

TABLE 6.22 DAPC RACK DEACTIVATION (CONT'D)

Step	PRCU 1	PRCU 2	Payload Rack
6.	DAPC Rack, front panel Power Supply #1: Place pwr sw - off AC Power Strip #1: Place pwr sw - off AC Power Strip #2: Place pwr sw - off Verify the following: • Power Supply #1 LED is off • AC Power Strip #1 LED is off • AC Power Strip #2 LED is off		

T:_____ QA: _____

6.5.10 Computational Rack Deactivation

The Computational Rack is the last of the network systems to be powered down. Once deactivated, the communication link to the PRCU Control Workstation no longer exists. However, independent systems (i.e. chillers, PEPSE), are capable of operating after the Computational Rack is powered down.

TABLE 6.23 COMPUTATIONAL RACK DEACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.	Computational Rack, front panel At Payload MDM: Place pwr sw - off Verify the following: • Payload MDM status lights are off • Payload MDM pwr sw is not illuminated		
2.	Computational Rack, rear panel VME Chassis #1: Place pwr sw - off VME Chassis #2: Place pwr sw - off		
3.	Computational Rack, rear panel AC Power Strip: Place pwr sw - off Verify the following: • VME Chassis #1 pwr sw is not illuminated • VME Chassis #2 pwr sw is not illuminated • AC Power Strip LED is off		**N/A:_____ T:_____ QA:_____**

T:_____ QA: _____

6.5.11 PEPSE Rack Deactivation

The PEPSE Rack serves as a power supply for the Payload Rack. If the PRCU configuration does not include a Payload Rack, the PEPSE need not be activated or deactivated. The PEPSE Rack can be activated and deactivated independently of the PRCU system.

TABLE 6.24 PEPSE RACK DEACTIVATION

Step	PRCU 1	PRCU 2	Payload Rack
1.	PEPSE Rack, front panel Depress: Output Pwr "STOP" button Record deactivation time in log book **NOTE:** Wait for system to cycle down to < 1 Vdc. Verify the following: • Orange LED light is off Place main pwr CB - off Verify the following: • "Output Pwr" LED is off • White Status lights are off		
2.	PEPSE, Main Facility Breaker Place main pwr CB - off Verify the following: • Handle is in the "OFF" or down position		

T:_____ QA: _____

APPENDIX A

Forms
For reference purposes only.

1. PROJECT CODE	2. JPIC CODE	**TASK PERFORMANCE SHEET** NASA - LYNDON B. JOHNSON SPACE CENTER			
3. TYPE A CONFIGURATION CHANGE ☐		4. TPS NO.		5. PAGE OF	
PERMANENT ☐ TEMPORARY ☐		6. MOD SHEET(S) NUMBER(S)	7. ORG.	8. SYSTEM	9. NEED DATE
B NONCONFIGURATION CHANGE ☐					
10. PART NAME	11. PART NO./DRAWING NO.		12. SERIAL/LOT	13. TIME/CYCLE/SHELF LIFE ☐ YES ☐ NO	
14. APPLICABLE DOCUMENTS	15. CONTRACT NO./JOB NO.		16. HAZ. TASK ☐ YES ☐ NO	17. ENG. EVAL. ☐ YES ☐ NO	
18. SHORT TITLE OF TPS				19. ADP UPDATE ☐ YES ☐ NO	

20. OPER SEQ. NO.	21. OPERATIONS *(Print, Type, or Write Legibly)*	VERIFICATION 22. TECH.	23. QA/DV

24. ORIGINATOR	DATE	25. FINAL ACCEPTANCE STAMP AND DATE

APPROVALS *(Printed or Typed and Signed)*

26. PROJECT ENGINEER	DATE	27. QUALITY ENGINEER	DATE
28.		29.	
30.		31.	

JSC Form 1225 (Rev February 7, 2000) (MS Word August 1996)

Figure A-1 Task Performance Sheet

		5. Page	of
TASK PERFORMANCE SHEET CONTINUATION PAGE NASA - LYNDON B. JOHNSON SPACE CENTER		4. TPS NO.	
		6. MOD NO.	

20. OPER SEQ. NO.	21. OPERATIONS *(Print, Type, or Write Legibly)*	VERIFICATION 22. TECH.	23. QA/DV

JSC Form 1225A (Rev February 7, 2000) (MS Word August 1996)

Figure A-2 Task Performance Continuation Sheet

1. JPIC

Discrepancy Report/Material Review Record
NASA - Lyndon B. Johnson Space Center

2. Page 1 of ____

3. Ref. Doc #	4. IDR #	5. DR #	
6. Name of Top Assy.	7. Drawing or P/N	8. S/N or Lot #	9. Qty.
10. Name of Sub Assy	11. Drawing or P/N	12. S/N or Lot #	13. Qty.
14. Name of Component	15. Drawing or P/N	16. S/N or Lot #	17. Qty.

18. Description of nonconformance

19. Initiator's name (print and sign)	20. Title/Stamp No.	21. Org.	22. Location	23. Date

24. Responsible Engineer/Mail Code	25. CHRP Code	26. CAGE Code	27. Time/cycles used	

xx. Category	29. PRACA Reportable	30. Configuration Change?	31. Waiver?	32. Corrective Action
☐ Critical	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Major				
☐ Minor	FIAR # _____	DCN # _____	Waiver # _____	CAS # _____

33. Final Disposition					34. MRB Req'd?	35. Final Acceptance Stamp and
☐ Rework	☐ Repair	☐ Change Classification	☐ Scrap		☐ Yes	
☐ Use-as-is	☐ Return to vendor/supplier	☐ Written in error			☐ No	

Material Review Board
(approvals must be typed or printed and signed)

36. Stress Engineer	Date	37. Materials Engineer	Date
38. Project Engineer	Date	39. Quality Engineer	Date
40. Other (print or type title)	Date	41. QA Rep. (NASA)	Date

T1 Resp. Org.	T2 HW Type	T3 Prev. Cond.	T4 Fail. Mode	T5 Defect	T6 Remedial Act.	T7 Cause	T8 Recur. Ctrl.	T9 Perf. Org.	T10 Proc. Flow

JSC Form 2176 (Rev August 10, 1999) (MS Word Sep 97)

Figure A-3 Discrepancy Report/Material Review Record

1. IDR #

2. DR #

Discrepancy Report/Material Review Record

NASA - Lyndon B. Johnson Space Center

3. Page ___ of ___

Continuation Sheet

4. Insp. Pts.	5. Seq. No.	6. Instructions *(Print, type, or write legibly)*	7. Verification Stamps Tech.	Qual.

8. Final Acceptance Stamp and Date

JSC Form 2176A (Sep 97) (MS Word Sep 97)

Figure A-4 Discrepancy Report/Material Review Record Continuation Sheet

1. DR #

Discrepancy Report/Material Review Record

NASA - Lyndon B. Johnson Space Center

2. Page ____ of ____

Summary Sheet

3. Configuration Change? ☐ No ☐ Yes DCN #

4. CCBD #

5. PRACA #

6. Remedial Action

7. Root Cause

8. Corrective Action (Recurrence Control)

MRB APPROVAL

9. Stress Engineer (Print and sign)	Date	10. Materials Engineer (Print and sign)	Date
11. Project Engineer (Print and sign)	Date	12. Quality Engineer (Print and sign)	Date
13. Other (Print and sign)	Date	14. QA Rep. (NASA) (Print and sign)	Date

JSC Form 2176B (Oct 97) (MS Word Sep 97)

Figure A-5 Discrepancy Report/Material Review Record Summary Sheet

1. DR #

Discrepancy Report/Material Review Record

NASA - Lyndon B. Johnson Space Center

2. Page ____ of ____

Multiple Disposition Coding Sheet

	T1 Resp. Org.	T2 HW Type	T3 Prev. Cond.	T4 Fail. Mode	T5 Defect	T6 Remedial Act.	T7 Cause	T8 Recur. Ctrl.	T9 Perf. Org.	T10 Proc. Flow
A.										
B.										
C.										
D.										
E.										
F.										

3. Quality Engineer (Print and Sign) Date

JSC Form 2176C (Oct 97) (MS Word Oct 97)

Figure A-6 Discrepancy Report/Material Review Record Multiple Disposition Coding Sheet

LOCKHEED MARTIN

FLASH REPORT

For Safety and Product Assurance use only

NASA mishap no.	
OSHA file no.	

GENERAL INFORMATION

1. Date (MM/DD/YY)	2. Time ☐ a.m. or ☐ p.m.
3. Building number/location	4. Specific area

5. Category of incident (check appropriate box)

☐ Injury/accident ☐ Fire

☐ Auto accident ☐ Explosion

☐ Chemical spill ☐ Other

6. Description of incident (explain what happened, including cause or description of failure)

7. SEAT involvement (name of organization)

PERSONNEL INVOLVED

8. Name (last, first, middle initial)	9. Telephone

CONTACT PERSON

10. Name (last, first, middle initial)	11. Telephone

FORM SEAT 094 (09/23/97)

Figure A-7 Flash Report

DISPOSAL INVENTORY
FOR MISCELLANEOUS HAZARDOUS WASTES

GENERAL NOTES:

1. Waste sources must be identified.
2. Exceptions:
   See JSCI 8837 (current issue) for disposal methods for batteries, ether, explosives, empty drums, paint and chemical containers, radioactive and biological wastes, and precious metals.
3. Containers must be waterproof.
4. Containers must be labeled; all unlabeled containers will be returned to generators for proper identification.
5. For pickup, call x32038

TO BE COMPLETED BY WASTE GENERATOR.

DATE
BUILDING NO.
ROOM NO.
NAME
PHONE EXTENSION
MAIL CODE
CARTON NO. _____ OF _____
Provide the following information at time of pickup: **PICK-UP TICKET NO.:**

INVENTORY

(Use a separate form for each carton of waste.
A copy of inventory must be in or on each carton.)

IDENTIFICATION AND SOURCE OF WASTE	AMOUNT	IDENTIFICATION AND SOURCE OF WASTE	AMOUNT

JSC Form 1161 (Rev Aug 97) (MS Word Aug 97) COPY 1 - SHIPPING COPY 2 COPY 3 - ORIGINATOR

Figure A-8 Disposal Inventory for Miscellaneous Hazardous Wastes

Repetitive Operations Log						
Control Document: LS-71139-2 Rev ___						Page ____ of ____
Section Number	Step Number(s)	Test Conductor	Date	Tech	QA	Reason/Remarks

Figure A-9 Repetitive Operations Log

Deviation					Page ___ of ___
TPS Number:			Document Number:	Project Manager:	Test Engineer:
Dev No	Section	Step	Type (P/T)	Change	Reason
Originator:			Phone:	Date:	Quality Engineer:

Figure A-10 Deviation Sheet

Deviation Continuation Page				TPS Number:	Document Number:	Page ___ of ___
Dev No	Section	Step	Type (P/T)	Change		Reason

Figure A-11 Deviation Continuation Sheet

APPENDIX B

Illustrations

N/A

DISTRIBUTION
FOR LS-71139-2

NASA/JSC
EA5/L. Bauer
EA5/E. Strong
NT3/GFE Assurance Branch
SF/D. Grounds

LOCKHEED MARTIN
C20/G. Harvey
C42/M. Gerlach
C64/S. Fetzer
C64/R. Henneke
C64/D. Reed
C64/R. Trittipo
C64/T. Wiggins
S03/D. Babic
S03/P. Miller
S03/J. Searcy
S03/Science Payloads Library
S18/J. Hoge
S18/M. Klee
S18/G. Salinas
S22/D. Barineau
S22/S. Bhaskaran
S22/R. Gonzales
S22/K. Lajaunie
S22/T. Leger
S22/C. McGee
S22/S. Tarver
S22/M. Trenolone (3)
S22/K. Upham
S22/E. Witt
S361/J. McDonald
S362/STI Center/Bldg. 36 (3)
S56/G. Geissen